

Interview Summary	Application No.	Applicant(s)	
	09/997,396	HUJANEN ET AL.	
	Examiner	Art Unit	
	DAVID VU	2818	

All participants (applicant, applicant's representative, PTO personnel):

(1) DAVID VU. (3) _____.

(2) ADEEL S. AKHTAR. (4) _____.

Date of Interview: 05 April 2005.

Type: a) ☐ Telephonic b) ☐ Video Conference
c) ☒ Personal [copy given to: 1) ☐ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
If Yes, brief description: _____.

Claim(s) discussed: 1,14,15,20 and 52.

Identification of prior art discussed: _____.

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant discussed a proposed amendment to the claims. Examiner will fully consider the amendment when formally submitted.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.



Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

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FIRM: United States Patent and Trademark Office
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FROM: Andrew N. Merickel
OPERATOR: Jonathan Pan
DATE: April 1, 2005

NO. OF PAGES: 6 (incl. cover sheet)
TIME:

IF YOU DID NOT RECEIVE ALL OF THE PAGES PLEASE CALL BACK IMMEDIATELY
OPERATOR PHONE NO.: (415) 954-4114 FACSIMILE NO.: (415) 954-4111

MESSAGE: Please see the attached Proposed Amendments.

CERTIFICATE OF FAX TRANSMISSION

I hereby certify that this correspondence and all marked attachments are being facsimile transmitted to the Patent and Trademark Office on the date shown below:

April 1, 2005

 (Date)

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PATENT

PROPOSED AMENDMENTS

Proposed amendments to Claims 1, 14, 15, 20, and 52 are provided below. Support for the amendments may be found, for example, at paragraph [0014] of the specification.

1. (Currently Amended) A method of fabricating a magnetic memory cell, comprising:

providing a substrate on which the magnetic memory cell is formed;

depositing a first ferromagnetic layer;

depositing a dielectric layer over the first ferromagnetic layer; and

depositing a second ferromagnetic layer over the dielectric layer, wherein depositing at least one of the first or second ferromagnetic layers comprises depositing a metal oxide by multiple ALD cycles and subsequently reducing the metal oxide to elemental metal.

2. (Original) The method of Claim 1, wherein the magnetic memory cell comprises a magnetic tunneling junction (MTJ).

3. (Original) The method of Claim 1, wherein the magnetic memory cell is a magnetic random access memory cell.

4. (Original) The method of Claim 1, wherein the dielectric layer is deposited by ALD.

5. (Original) The method of Claim 1, wherein the dielectric layer comprises aluminum oxide.

6. (Original) The method of Claim 1, wherein the first ferromagnetic layer is deposited by ALD.

7. (Original) The method of Claim 6, wherein depositing the first ferromagnetic layer by ALD comprises depositing a metal oxide by ALD and subsequently reducing the metal oxide to elemental metal.

8. (Previously Presented) The method of Claim 7, wherein the elemental metal comprises cobalt.

9. (Original) The method of Claim 1, wherein depositing the second ferromagnetic layer comprises an ALD process.

10. (Original) The method of Claim 9, wherein depositing the second ferromagnetic layer comprises depositing a metal oxide by ALD and subsequently reducing the metal oxide to elemental metal.

11. (Original) The method of Claim 10, wherein the elemental metal comprises cobalt.

12. (Original) The method of Claim 1, wherein the first ferromagnetic layer has a lower magnetic permeability than the second ferromagnetic layer.

13. (Original) The method of Claim 1, wherein the first ferromagnetic layer is thinner than the second ferromagnetic layer.

14. (Currently Amended) A method of fabricating a magnetic memory cell, comprising:

providing a substrate on which the magnetic memory cell is formed;

depositing a first magnetic layer on the substrate;

forming a dielectric layer over the first magnetic layer;

depositing a magnetic metal oxide layer over the dielectric layer by multiple atomic layer deposition (ALD) cycles; and

reducing the magnetic metal oxide layer to a magnetic elemental metal layer.

15. (Currently Amended) A method of fabricating a magnetic memory cell, comprising:

providing a substrate on which the magnetic memory cell is formed;

forming a first magnetic layer on the substrate;

depositing a first non-magnetic metal oxide layer over the first magnetic layer;

converting the first non-magnetic metal oxide layer to a first non-magnetic metal layer;

depositing an insulating layer on the first non-magnetic metal layer;

depositing a second non-magnetic metal oxide layer by multiple atomic layer deposition (ALD) cycles;

converting the second non-magnetic metal oxide layer to a second non-magnetic metal layer; and

depositing a second magnetic layer on the second non-magnetic metal layer.

16. (Original) The method of Claim 15, wherein the first non-magnetic metal oxide layer is deposited by ALD.

17. (Original) The method of Claim 15, wherein the first non-magnetic metal oxide layer and the second non-magnetic metal oxide layer are converted to the first and second non-magnetic metal layers by reducing the metal oxide to elemental metal.

18. (Original) The method of Claim 17, wherein reducing comprises exposing the metal oxide layer to a chemical selected from the group consisting of hydrogen, hydrogen-rich radicals, carbon monoxide, alcohol vapor, aldehyde vapor and carboxylic acid vapor.

19. (Original) The method of Claim 15, wherein the first and the second non-magnetic metal oxide layers comprise copper oxide.

20. (Currently Amended) A method of fabricating a magnetic nanolaminate structure, comprising:

depositing a plurality of metal oxide layers on a substrate by multiple atomic layer deposition (ALD) cycles, wherein at least two of the metal oxide layers differ in composition; and

subsequently converting at least one of the plurality of metal oxide layers to elemental metal layers, wherein at least one of the metal oxide layers is magnetic.

21. (Original) The method of Claim 20, wherein the magnetic nanolaminate structure is part of a magnetic memory device.

22. (Original) The method of Claim 20, wherein the magnetic nanolaminate structure is part of a read-head.

23. (Original) The method of Claim 20, wherein the magnetic nanolaminate structure comprises a magnetic tunneling junction.

24. (Original) The method of Claim 20, wherein the magnetic nanolaminate structure is part of a spin valve transistor.

25. (Original) The method of Claim 20, wherein depositing the plurality of metal oxide layers comprises, in order: depositing a first magnetic metal oxide layer, depositing an insulating layer, and depositing a second magnetic metal oxide layer.

26. (Original) The method of Claim 20, wherein depositing the plurality of metal oxide layers comprises, in order: depositing a first magnetic metal oxide layer, depositing a first

non-magnetic metal oxide layer, depositing an insulating layer, depositing a second non-magnetic metal oxide layer, and depositing a second magnetic metal oxide layer.

27. (Original) The method of Claim 20, wherein converting comprises reducing a metal oxide layer to elemental metal.

28. (Original) The method of Claim 27, wherein reducing comprises contacting the layer with a compound selected from the group consisting of hydrogen, hydrogen-rich radicals, carbon monoxide, alcohol vapor, aldehyde vapor and carboxylic acid vapor.

29. (Original) The method of Claim 20, wherein at least one of the metal oxide layers comprises a ferromagnetic oxide selected from the group consisting of magnetite (Fe_3O_4), CrO_2 , manganite perovskites doped with alkaline earth metals and metal oxide superlattices.

30. (Original) The method of Claim 20, wherein the magnetic nanolaminate comprises at least one magnetic metal selected from the group consisting of iron (Fe), cobalt (Co) and nickel (Ni).

31. (Original) The method of Claim 20, wherein the magnetic nanolaminate comprises at least one non-magnetic metal.

32. (Original) The method of Claim 31, wherein the non-magnetic metal is copper.

33. - 45 (Withdrawn)

46. (Original) A method of fabricating a sensing element of a read-head comprising:
providing a substrate on which the sensing element is to be formed;
depositing a first ferromagnetic layer by atomic layer deposition (ALD);
depositing a conductive layer over the first ferromagnetic layer; and
depositing a second ferromagnetic layer over the conductive layer.

47. (Original) The method of Claim 46, wherein the conductive layer is deposited by atomic layer deposition.

48. (Original) The method of Claim 46, wherein the second ferromagnetic layer is deposited by atomic layer deposition.

49. (Original) The method of Claim 46, wherein the first ferromagnetic layer comprises NiFe and the second ferromagnetic layer comprises Co.

50. (Original) The method of Claim 46, wherein the conductive layer comprises Cu.

51. (Cancelled)

52. (Currently Amended) A method of fabricating a magnetic memory cell, comprising:

providing a substrate on which the magnetic memory cell is formed;

depositing a first ferromagnetic layer;

depositing a dielectric layer over the first ferromagnetic layer; and

depositing a second ferromagnetic layer over the dielectric layer, wherein depositing at least one of the first or second ferromagnetic layers comprises depositing a metal oxide by multiple ALD cycles and subsequently reducing the metal oxide to elemental metal.

53. (Previously Presented) The method of Claim 52, wherein the elemental metal comprises cobalt.

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